VERIFICATION OF A TRANSLATION

I, the below named translator, hereby declare that:

My name and post office address are as stated below;

That I am knowledgeable in the English language and in the language in which the below identified Japanese application was filed, and that I believe the attached English translation of the Japanese Patent Application No. HEI 11-304069 filed on October 26, 1999 is a true and complete translation of the above-identified Japanese application as filed.

Date February 6, 2003

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[Document Name] Specification

[Title of Invention] MASSAGING APPARATUS

[Claims]

1. A massaging apparatus comprising a therapeutic member (26) for massaging a user's body provided so as to be movable along the user's body in the vertical direction, characterized in that a position detecting means (38) for detecting a position of a specific portion (S) of the body is provided so that a detected value (β1, β2) obtained by the position detecting means (38) in the process of movement of the therapeutic member (26) from a lower position to an upper position of the specific portion (S) is recognized as the position of the specific portion (S) of the body.

2. A massaging apparatus as set forth in Claim 1, characterized in that the detected value (β1, β2) obtained by the position detecting means (38) in the process of reverse and upward movement of the therapeutic member (26) after being moved downward to the position lower than the specific portion (S) of the body once is recognized as the position of the specific portion (S) of the body.

3. A massaging apparatus as set forth in Claim 1, characterized in that a first value (α1, α2) detected by the position detecting means (38) in the process of downward movement of the therapeutic member (26) from the upper position of the specific portion (S) of the body and a second value (β1,

β2) detected by the position detecting means (38) in the process of upward movement thereof from the lower position of the specific portion (S) of the body are compared, and when these values are in close agreement with each other, the second value (β1, β2) is recognized as the position of the specific portion (S) of the body.

4. A massaging apparatus as set forth in Claim 1, characterized in that the therapeutic member (26) moves upward a plurality of times and the position of the specific portion (S) is detected by the position detecting means (38) in each process of upward movements, and when detected values (β1, β2) are in close agreement with each other, the value (β2) obtained by the final detection is recognized as the position of the specific portion (S) of the body.

[Detailed Description of the Invention]

[Technical Field of the Invention]

The present invention relates to a massaging apparatus, specifically a massaging apparatus capable of detecting a position of a specific portion such as a shoulder of a user.

[Prior Art]

Conventionally, there is a known chair type massaging apparatus comprising a massaging mechanism that is movable upward and downward with respect to a seatback of a seat, in which therapeutic members are provided in this massaging mechanism to perform massage such as kneading or rapping for

the neck, shoulders, back, or hip of a user.

A massaging apparatus comprising an automatic therapeutic function having a program of motion or action of a therapeutic member stored in advance to automatically carry out a series of massaging motion according to the stored program (a series of action such as kneading or rapping), and comprising a mechanism that can automatically change a vertical position at which the therapeutic member performs massaging motion according to a seated height of a user prior to perform automatic therapy is also known.

For example, a chair type massaging apparatus as disclosed in the Japanese Patent Publication No.2511451 is operated in such a manner that a therapeutic member is moved once to an uppermost position and then moved downward to a position where it abuts to the shoulder of the user, and then the shoulder position is recognized by a detected signal from a pressure sensor integrated in the therapeutic member and set as a point of origin of massaging motion prior to perform automatic therapy. Then, a series of massaging motion programmed upward or downward is performed successively with the point of origin regarded as a reference point.

Therefore, this massaging apparatus can detect the shoulder position of the user automatically and perform massaging motion according to the physique of the user without troublesome operation such as manually adjusting the position

of the therapeutic member to match with the body of the user or entering data such as user's height or the seated height.

[Problems to be Solved by the Invention]

Normally, when using the chair type massaging machine, massaging motion is started by operating the switch provided on the armrest or the like immediately after sitting on the seat. However, immediately after sitting on the seat, the user is in many cases in an unstable state such that he/she is not seated deep enough or the his/her back is not completely fitted with the seatback portion, or his/her back is bent and thus disturbed to take a proper posture due to action to operate the operating switch.

On the other hand, in the chair type massaging machine of the related art, since the therapeutic member may be kept in "stored" state in which it is withdrawn to the uppermost position (upper position than the head of the user) when not in use, the massaging motion actually starts from this "stored" state in many cases, and thus the therapeutic member starts to move directly downward to detect the shoulder position without taking a process of upward movement when operating the switch.

Therefore, assuming that the shoulder position of the user is detected by moving the therapeutic member directly downward immediately after the user is seated, it cannot detect the accurate value because the seating state is not stable and

thus the massaging motion is performed with the wrong shoulder position as a point of origin, whereby effective massage cannot be expected.

With such circumstances in view, it is an object of the present invention to provide a massaging apparatus that can perform an effective massage suitable to the physique of the user by recognizing the value detected accurately by the position detecting means for detecting the position of a specific portion of the body as a position of the specific portion for controlling massaging operation.

[Means for Solving the Problem]

In the present invention, the following technical means are instituted in order to achieve the above-described object.

The present invention is a massaging apparatus comprising a therapeutic member for massaging a user's body provided so as to move along the user's body in the vertical direction, and is characterized in that a position detecting means for detecting a position of a specific portion of the body is provided so that a detected value obtained by the position detecting means in a process of movement of the therapeutic member from a lower position to an upper position of the specific portion is recognized as the position of the specific portion.

In this case, for example, when the therapeutic member is moved upward from hip to shoulder along the body, the back

of the user is stretched by a "rubbing" effect of the therapeutic member, more specifically, the "rubbing" action on the hip portion corrects the posture of the user so that the back portion comes into intimate contact with the seatback portion. In addition, since the "rubbing" effect allows the user's body to fit with the massaging apparatus, the user leaves his/her body naturally to the massaging apparatus thereby stabilizing the posture.

Since the detected value obtained by the position detecting means in the process of the upward movement of the therapeutic member is considered to be a value that indicates an exact position of the specific portion of the body that is obtained in a state in which the posture of the user is corrected or stabilized, the physique of the user can be accurately determined by recognizing the detected value as the position of the specific portion of the body for controlling massaging operation.

Therefore, recognition of an erroneously detected value caused by an improper posture of the user as the position of the specific portion of the body can be prevented as much as possible, thereby enabling effective massage corresponding to the physique of the user determined based on an accurately detected value.

The present invention is characterized in that the detected value obtained by the position detecting means in the

process of reverse and upward movement of the therapeutic member after being moved downward to the position lower than the specific portion of the body once is recognized as the position of the specific portion of the body.

In this arrangement, since the posture of the user is positively corrected by the "rubbing" movement by the upward and downward reciprocal movement of the therapeutic member, and thus the posture of the user is further stabilized, accuracy of the detected value obtained in the process of upward movement is improved.

The present invention is characterized in that a first value detected by the position detecting means in the process of downward movement of the therapeutic member from the upper position of the specific portion of the body and a second value detected by the position detecting means in the process of upward movement thereof from the lower position of the specific portion of the body are compared, and when these values are in close agreement with each other, the second value is recognized as the position of the specific portion of the body.

In this arrangement, before recognizing a detected value obtained in the process of upward movement of the therapeutic member as the position of the specific portion of the body (second detected value), it is compared with a detected value obtained in the process of downward movement of the therapeutic member (first detected value), and when these detected values

are in close agreement with each other, the second detected value is recognized as the position of the specific portion of the body.

In other words, highly reliable and accurate recognition of a position is realized by imposing prescribed condition to the second detected value, and the physique of the user can be determined more accurately in comparison with the case where the second detected value obtained simply in the process of upward movement is recognized as the position of the specific portion of the body.

The present invention is characterized in that the therapeutic member moves upward for a plurality of times and the position of the specific portion is detected by the position detecting means in every process of upward movement, and when the detected values are in close agreement with each other, a value obtained in the final detection is recognized as the position of said specific portion.

In this arrangement, comparing a plurality of detected values obtained in the process of the plurality of times of upward movements of the therapeutic member improves reliability and accuracy of recognition of the position, and when these detected values are in close agreement with each other, the value obtained in the final detection in a state in which the posture is positively corrected and stabilized by "rubbing" effect of a plurality of times of upward movement

of the therapeutic member is recognized as the position of the specific portion of the body, thereby determining the physique of the user more accurately.

[Mode for Carrying Out the Invention]

Hereinafter, embodiments of the present invention will be described referring to figures.

Fig. 4 shows a massaging apparatus 1 according to the present invention. The massaging apparatus 1 is a chair type massaging apparatus comprising a main body (therapeutic bed) 4 having a seat portion 2 on which the user sits and a seatback portion 3 for supporting the back of the user.

In the seatback portion 3 of the main body 4 of the chair, there are provided a moving frame 6 being movable vertically therein by a locomotive drive 5, and a massaging mechanism 7 on the moving frame 6. On the front side of the massaging mechanism 7 is covered with a flexible covering member 15 formed of cloth or leather.

The main body 4 of the chair comprises a seatback portion 3, a seat portion 2, a footrest 8, and a leg body 10 having arm rests 9 on both sides of the seat portion 2 formed in one piece. The seatback portion 3 and the footrest 8 are adapted to be angularly moved with respect to the seat portion 2 by means of any suitable electric driving mechanism, a fluid pressure driving mechanism, a manual structure, or the like for reclining operation.

The locomotive drive 5 comprises a longitudinal-feed-thread-shaft 11 provided so as to rotate about an axis vertically extending along the seatback 3, and a power station 12 having a motor with a speed reducer or the like for driving the longitudinal-feed-thread-shaft 11 in the forward and reverse direction, and the longitudinal-feed-thread-shaft 11 passes through suitable portions of the massaging mechanism 7 or the moving frame 6 into threading engagement therewith. The moving frame 6 is rectangular in shape formed by connecting upper and lower ends of left and right frame bodies 6A, 6A with upper and lower frame bodies 6B, 6B as shown in Fig. 2 and Fig. 3, the left and the right frame bodies 6A, 6A are respectively provided with a pair of upper and lower traveling rollers 13 on the outsides thereof, and the traveling rollers 13 are rotatably mounted to two guide rails 14 provided vertically in the seatback portion 3. With this arrangement, the massaging mechanism 7 can be moved along the back surface of the upper half of the user's body sitting on the seat portion 2 vertically toward the neck or toward the hip by the operation of the locomotive drive 5.

The massaging mechanism 7 has a preset upper limit of the upward movement at an upwardly withdrawn position above the head of the user and a preset lower limit of the downward movement at a position below the hip, and as shown in Fig. 1, an upper limit switch S1 and a lower limit switch S2 are provided

on the upper limit A1 and the lower limit A2, respectively.

Therefore, when the massaging mechanism 7 moves vertically and reaches the upper limit A1 or the lower limit A2, signals from the upper or the lower limit switches S1 or S2 is fed to a control unit, not shown, and the control unit performs the control of the vertical movement of the massaging mechanism 7 so as to stop or to reverse.

The position of vertical movement (amount of movement) of the massaging mechanism 7 is detected by a vertical position detecting section, not shown, and the vertical position detecting section of this embodiment converts the number of revolution or the angle of revolution of the longitudinal-feed-thread-shaft 11 or the power station 12 into pulses by means of rotary encoder or the like and counts the number of pulses to detect the amount of movement.

The locomotive drive 5 may be replaced by a wrapping driving mechanism, an engagement structure of rack-and- pinion, or a hoist drive structure using a fluid pressure cylinder or the like, and the position detecting section may be replaced by suitable means such as a structure in which the vertical position of the massaging mechanism 7 is optically detected by a photoelectric sensor or the like.

The massaging mechanism 7 comprises a drive unit 20 having a kneading motion shaft 21 and a rapping motion shaft 22 projecting toward the left and the right sides, a power

station 23 having an electric motor connected to the drive unit 20, a pair of drive arms 24 extending in the lateral direction (in the direction of the width of the user's body) held by the respective motion shafts 21, 22, a supporting arm 25 connected to the tip of each of the drive arms 24, and a roller type therapeutic member 26 rotatably mounted on each of the upper and the lower ends of the supporting arm 25 via a lateral supporting shaft 30.

The kneading motion shaft 21 and the rapping motion shaft 22 are laterally disposed in parallel to each other with vertically spaced therebetween. An output from the power station 23 is fed to a transmission shaft in the drive unit 20 via a belt transmission mechanism or the like, so that the kneading motion shaft 21 and the rapping motion shaft 22 are selectively rotated via a gear or a clutch or the like in the same unit 20.

Both ends of the kneading motion shaft 21 are provided with inclined shaft portions 21a eccentrically inclined and angularly displaced with respect to the axis of rotation, and a rear end of the drive arm 24 is attached to the inclined shaft portion 21a via a bearing.

The supporting arm 25 is formed of a plate of V-shape rotated by 90 degrees to the right in side view comprising a first supporting portion 25a projecting toward the user in the diagonally upper front direction and a second supporting

portion 25b projecting in the lower front direction to form an obtuse angle with respect to the first supporting portion 25a, and the vertical midpoint thereof is connected to the tip of the drive arm 24 via a lateral supporting shaft 24a so as to rotate about the axis thereof. There is provided a tension coil spring 27 between the supporting arm 25 and the drive arm 24 under the supporting shaft 24a so that a resiliency which urges the upper portion of the supporting arm 25 forward is provided.

There is formed a space X (a triangle region enclosed by dashed lines in Fig. 1) opening toward the user between the first and second supporting portions 25a and 25b, and this space X contributes to prevent the supporting arm 25 from touching the back or the shoulder of the user while the therapeutic member 26 is performing massaging motion.

On both ends of the rapping motion shaft 22, there are provided eccentric shaft portions 22a that are off-centered with respect to the axis of rotation in the opposite direction, to which a lower end of a connecting rod 28 is pivotally connected via a bearing, and an upper end of the connecting rod 28 is pivotally connected to a lower surface of the drive arm 24 via a ball bearing or the like.

In this arrangement, when the power station 23 rotates the kneading motion shaft 21, the inclined shaft portions 21a at the both ends of the kneading motion shaft 21 allow the

therapeutic members 26 opposing on the right and left sides to each other to perform circumferential movement including laterally reciprocating movement toward and away from each other, thereby performing kneading motion.

When the rapping motion shaft 22 rotates, the eccentric shaft portions 22a on both ends thereof make the drive arm 24 reciprocate vertically via the connecting arm 28, whereby the therapeutic members 26 perform rapping motion via the supporting arm 25 rotatably connected to the drive arm 24.

When the massaging mechanism 7 is moved vertically by the locomotive drive 5 with the rotation of the kneading motion shaft 21 and the rapping motion shaft 22 stopped, the therapeutic member 26 performs "rubbing" massage (rolling massage) while pushing the back of the upper half of the user's body.

While the kneading motion shaft 21 and the rapping motion shaft 22 are adapted so that a power from the power station 23 is selectively transmitted thereto via the clutch in the drive unit 20, separate special power stations may be provided for the motion shafts 21, 22 respectively.

The massaging apparatus 1 of the present invention comprises a position detecting means 38 for detecting the position of the specific portion of the user's body, and the control unit has a feature to recognize a value detected accurately by the position detecting means 38 as a position

of a specific portion of a body for controlling massaging operation, which is recognized as a reference point of the massaging motion.

In other words, prior to the commencement of the massaging motion, the position detecting means 38 detects the position of the specific portion and determines whether or not the detected value is proper, and when it is determined to be proper, the detected value is recognized as the position of the specific portion and massage is performed with the position as a reference point, whereby effective massage is performed according to the physique of the user.

Specifically, the position detecting means 38 of this embodiment is adapted to detect a position of the user's shoulder S as a specific portion of the body, and thus a vertical position detecting section for detecting the vertical position of the therapeutic members 26 (massaging mechanism 7) and a detector 40 for detecting the shoulder S are provided.

A micro switch that is turned ON and OFF when it touches directly the shoulder S of the user is employed as the detector 40, and mounted and fixed to the lower side portion of the first supporting portion 25a of the supporting arm 25 with a contact 40a projected into the space X between the first and second supporting portions 25a and 25b.

When the shoulder S abuts against the contact 40a and the micro switch 40 is turned ON, the vertical position of the

therapeutic member 26 at this moment corresponds to the position of the shoulder S, whereby the position detecting means 38 detects the vertical position of the therapeutic member 26 as a detected value.

The flow-charts shown in Fig. 5 to Fig. 7 show the procedure of detection of a specific portion and determination of the detected value by the position detecting means 38. Referring now to Fig. 1 and Fig. 2 as well, these flow-charts are described.

In the initial state of the massaging apparatus 1, the massaging mechanism 7 is stored at the upper limit A1, and in this state, the pulse count is reset to zero at the vertical position detecting section. Since no load is applied to the therapeutic members 26 from the user, the upper therapeutic member 26 projects forward by the action of the tension coil spring 27, and in contrast to it, the lower therapeutic member 26 takes a retracted position.

When the operation switch of the massaging apparatus 1 is turned ON (step 1), the massaging mechanism 7 starts the downward movement actuated by the locomotive drive 5 (step 2), and the vertical position detecting section starts counting the vertical movement of the massaging mechanism 7 (step 3).

When the massaging mechanism 7 moves downward and the upper therapeutic member 26 approaches or abuts against the upper portion of the user's shoulder S, the user's shoulder

S is placed in the space X below the first supporting portion 25a and directly touches (substantially, directly via the covering member 15) the contact 40a of the micro switch 40, and the micro switch 40 is switched from OFF to ON (the state M2 in Fig. 1, and the state shown in Fig. 2. step 4).

The position detecting means 38 detects the position of the massaging mechanism 7 at the moment when the micro switch 40 is switched ON as a detected value (first detected value) $\alpha 1$, which is to be stored in the memory in the control unit (step 5).

The first detected value $\alpha 1$ obtained here is not recognized as the shoulder position for controlling massaging operation that is considered as a reference point of the massaging motion, but used for reference purpose for comparing with a second detected value $\beta 1$.

After the first detected value $\alpha 1$ is detected, the massaging mechanism 7 is moved downward to the lower limit A2, and this downward movement perform the "rubbing" massage on the upper half of the user's body (back). When the upper therapeutic member 26 comes into contact with the back, the supporting arm 25 pivots upward and thus the shoulder comes out from the space X, and the micro switch 40 is turned from ON to OFF (the state M3 in Fig. 1).

When the massaging mechanism 7 reaches the lower limit A2, the locomotive drive 5 makes the reverse motion by a signal

from the lower limit switch S1 and thus the vertical movement of the massaging mechanism 7 is also reversed. When the upward movement of the massaging mechanism 7 starts, the vertical position detecting section starts counting the vertical position thereof (step 6 to step 8).

During the upward movement of the massaging mechanism 7, the therapeutic member 26 again performs "rubbing" massage on the back, and when the upper therapeutic member 26 reached the position coming off the back, the supporting arm 25 pivots downward by a pressure applied to the lower therapeutic member 26 from the back and a force urged by a tension coil spring 27 so that the upper therapeutic member 26 abuts against or approaches the upper portion of the shoulder S.

At this moment, the shoulder S is placed in the space X again and touches the contact 40a of the micro switch 40 to switch the micro switch 40 from OFF to ON (step 9), and the position detecting means 38 detects the position of the massaging mechanism 7 at the moment when the micro switch 40 is turned ON as a detected value (second detected value) β1. The second detected value β1 is stored in the memory in the control unit (step 10).

When the vertical reciprocating movement of the therapeutic member 26 provides "rubbing" massage on the user's back, the user's back is stretched, and especially when the therapeutic member 26 moves from the hip side, which is located

at the position lower than the shoulder S, upward along the body, the posture of the user is corrected so that the back fits with the seatback 3 before the micro switch 40 detects the shoulder S.

In addition, when a "rubbing" massage is performed, the user's body fits with the chair body 4, and thus the back of the user leans against the seatback 3 naturally, thereby stabilizing the posture.

Therefore, since the second detected value $\beta 1$ is detected in a state in which the posture is corrected, or in a stabilized state, it is considered to be more accurate as an indicator of the shoulder position in comparison with the first detected value $\alpha 1$.

Here, since the second detected value $\beta 1$ is recognized as the shoulder position for controlling massaging operation, which is a reference point of the massaging motion, the physique of the user can be determined more accurately than that of the related art. However, in the present invention, in order to improve reliability, two detected values $\alpha 1$ and $\beta 1$ are compared with respect to each other and when the values $\alpha 1$ and $\beta 1$ are in close agreement with each other, the second detected value $\beta 1$, which is considered to be more accurate, is determined to be the shoulder position (determination 1, step 11).

Accordingly, the accurate shoulder position is obtained, and the massaging motion is performed with this position as

a reference point, so that more effective massage can be performed according to the physique of the user.

The state in which the first and second detected values $\alpha1$ and $\beta1$ are in close agreement with each other includes a state where both of the values $\alpha1$ and $\beta1$ are exact agreement with each other as a matter of course, and a state in which the second detected value $\beta1$ is within a prescribed range wherein the first detected value $\alpha1$ is included (approximated state).

Specifically, in this embodiment, when the second detected value $\beta1$ is within the range of the first detected value $\alpha1 \pm 5P$ (P = number of pulses), the first and second detected values $\alpha1$ and $\beta1$ are determined to be in close agreement with each other.

The comparative range is not limited to the range described above, but rather modifiable as appropriate. It is also possible to be constructed in such a manner that whether or not the first detected value $\alpha1$ is contained within a prescribed range including the second detected value $\beta1$ is determined.

When the first and second detected values $\alpha1$ and $\beta1$ are in close agreement with each other, the second detected value $\beta1$ is recognized as the shoulder position for controlling massaging operation, which is a reference point of the massaging motion, and the massage motion based on the shoulder

position $\beta 1$ starts and the step of detection and determination of the shoulder position terminates (step 12).

When the first and second detected values $\alpha 1$ and $\beta 1$ are not in close agreement with each other, or when the position of the shoulder S could not be determined by the determination 1, in this embodiment, the detection and determination of the shoulder position are performed again by repeating the procedures described above.

In other words, after obtaining the second detected value $\beta 1$, the massaging mechanism 7 is moved upward to the upper limit A1, the pulse count at the vertical position detecting section is reset to zero again (steps 13, 14), and the downward movement of the massaging mechanism 7 is started by reverse motion of the locomotive drive 5, and simultaneously, the count of the position is started at the vertical position detecting section (steps 15, 16).

Then, in the same operation as described above, a first detected value $\alpha 2$ is obtained and stored in the memory (steps 17, 18), and the therapeutic member 26 applies a "rubbing" massage to the user's back from the top to the bottom.

When the massaging mechanism 7 reaches the lower limit A2, the locomotive drive 5 makes reverse motion by a signal from the lower limit switch S1, and the massaging mechanism 7 is reversed to start the upward movement. Simultaneously, the vertical position detecting section starts to count the

vertical position (step 19 to step 21).

In the process that the therapeutic member 26 performs a "rubbing" massage on the hip and the back upwardly from the bottom, the position detecting means 38 detects a second value $\beta 2$ and stores the same in the memory (steps 22, 23).

Then, whether or not the first and second detected values $\alpha 2$, $\beta 2$ are in close agreement with each other, or whether or not the second detected value $\beta 2$ is contained within the prescribed range containing the first detected value $\alpha 2$ is determined (determination 2), and when they are in close agreement with each other, the second detected value $\beta 2$ is recognized as the shoulder position and the massaging motion is started based on that position as a reference point (steps 24, 25).

In the determination 2, as in the case of the determination 1 described above, when the second detected value $\beta 2$ is within the range of the first detected value $\alpha 1 \pm 5P$ (P = number of pulses), the first and second detected values $\alpha 1$ and $\beta 1$ are considered to be in close agreement with each other. However, the condition is not limited thereto.

When the first and second detected values $\alpha 2$ and $\beta 2$ are not in close agreement with each other, or when the shoulder position could not be determined, the second detected value $\beta 1$ obtained first in the process that the massaging mechanism 7 moves upward and the second detected value $\beta 2$ detected for

the second time (last time) are compared (determination 3), and when both of these values are in close agreement with each other, the second detected value β2 last obtained is recognized as the shoulder position (step 26).

The second detected values β1 and β2 detected in the process of the upward movement of the massaging mechanism 7 are the values detected in a state where the posture is corrected or stabilized state as described above, and thus the provability that they represents the accurate position of the shoulder is considered to be high. Therefore, when these values are found to be in exact agreement with each other by the comparison between these detected values β1, β2, it is considered that these detected values β1, β2 generally represent the accurate position of the shoulder S. The physique of the user can be determined accurately by recognizing the second detected value β2 obtained for the second time in a state in which the user's posture is positively corrected or stabilized by a plurality of times of upward and downward movements of the therapeutic member 25 as the position of the shoulder S.

In this embodiment, the determination 3 determines whether or not the second detected value β2 last obtained is contained within a prescribed range including the second detected value β1 detected first, more specifically, the second detected value β2 last obtained is within the range of the

second detected value $\beta 1$ detected first $\pm$ 5P (P = number of pulses). In this case as well, the condition is not limited thereto, but rather modifiable as appropriate.

As is described thus far, in the present invention, the physique of the user is determined accurately by determining the accurate second detected values $\beta 1$, $\beta 2$ obtained in the process of the upward movement of the therapeutic member 26 as the position of the shoulder S for controlling massaging operation, not by the first detected value $\alpha 1$, $\alpha 2$ obtained in the process of downward movement of the same, thereby performing effective massage.

In the determination 3, when the second detected value $\beta 1$ first obtained and the second detected value $\beta 2$ last obtained are not in close agreement with each other, or when the position of the shoulder could not recognized, the data of the shoulder position $\gamma 1$ is calculated by substituting all the detected values $\alpha 1$, $\beta 1$, $\alpha 2$, and $\beta 2$ to a prescribed arithmetic equation in this embodiment (step 27).

As a method of calculating the data of the shoulder position $\gamma 1$, for example, a method to take an average value of the detected values $\alpha 1$, $\beta 1$, $\alpha 2$, and $\beta 2$ (equation 1), or a method in which each detected values $\alpha 1$, $\beta 1$, $\alpha 2$, and $\beta 2$ is multiplied by "weight" ($\delta 1$-$\delta 4$) in the order that is considered to be accurate ($\beta 2$-$\beta 1$-$\alpha 2$-$\alpha 1$, or $\beta 2$-$\alpha 2$-$\beta 1$-$\alpha 1$) and the sum of them is divided by the sum of "weight" (equation 2) may be

employed, and some other statistical methods may be employed as appropriate.

After the data of the shoulder position $\gamma 1$ is calculated, massaging motion is started based on the data of the shoulder position $\gamma 1$ (step 28) and the step of detecting the shoulder position is terminated.

Fig. 8 to Fig. 15 show other embodiments of the position detecting means 38.

Especially the embodiments shown in Fig. 8 to Fig. 10 use a contact-type sensor such as a micro switch or the like as the detector 40 of the position detecting means 38, as in the case of the above-described embodiment, but the mounting portion or the construction is different. The detectors 40 shown in Fig. 11 to Fig. 15 detect the load applied to the therapeutic member 26 from the user's body, and the detector 40 shown in Fig. 16 (40A to 40D) uses a sensor of non-contact type.

Each embodiment will be described below.

In the embodiment shown in Fig. 8, the micro switch 40 is provided associated with the therapeutic members 26 on the upper side of the supporting arm 25, and a vertically elongated hole 45 is formed on the upper portion of the supporting arm 25, through which the proximal end of the supporting shaft 30 having a lateral axis is attached via a mounting member 46. The mounting member 46 comprises a cylindrical portion 46a to

be inserted through the elongated hole 45 so as to be movable in the vertical direction with respect thereto, and a flange portion 46b formed on the both ends of the cylindrical portion 46a, so that the flange portion 46b prevents the cylindrical portion from coming off the elongated hole 45.

The supporting arm 25 is provided on the upper end thereof with a micro switch 40 having a contact 40a oriented downward, and there is provided an abutment strip 46c that can abut against the contact 40a at the upper end of the flange portion 46b.

At the center of the therapeutic member 26, there is provided a boss body 31 having a cylindrical portion 31a to be rotatably fitted on the supporting shaft 30 and flanges 31b formed on the left and the right sides of the cylindrical portion 31a for interposing the therapeutic member 26 therebetween, and a mounting nut 32 for preventing coming off of the therapeutic member 26 is threadingly engaged with the tip of the supporting shaft 30 via a washer or the like.

In the arrangement described above, when the therapeutic member 26 is moved downward from the head side of the user and comes into contact with the upper surface of the shoulder S, the therapeutic member moves upward along the elongated hole 45, whereby the abutment strip 46c abuts against the contact 40a to turn the micro switch 40 ON. Therefore, the position of the therapeutic member 26 at the moment when the micro switch

40 is turned on indicates the shoulder position and the position detecting means 38 detects this position as first detected values $\alpha1$, $\alpha2$.

When the therapeutic member 26 is moved upward from the hip side, the therapeutic member 26 is moved to the lower side of the elongated hole 45 due to the resistance applied by the back of the body or its own weight, and thus the micro switch 40 is turned OFF. On the other hand, when the shoulder S is placed under the therapeutic member 26, the therapeutic member 26 is moved upward, and thus the abutment strip 46c abuts against the contact 40a to turn the micro switch 40 ON. Therefore, the position of the therapeutic member 26 at the moment when the micro switch 40 is turned ON indicates the position of the shoulder S, and this position is detected as second values $\beta1$, $\beta2$.

In the embodiment shown in Fig. 9, the first supporting portion 25a and the second supporting portion 25b of the supporting arm 25 are divided at a position above the supporting shaft 24a and both of them are connected by a connecting shaft 50 so as to rotate about the lateral axis. There is provided a tension coil spring 49 on the front side of each of the supporting portions 25a and 25b so as to urge both portions in the direction that makes them to pivot forward, and a stopper member 47 limits the pivotal movement thereof at a prescribed position.

A micro switch 40 having a contact 40a oriented upward is mounted on the upper rear end of the second supporting portion 25b, and an abutment strip 48 that can abut against the contact 40a is integrally formed on the lower rear end of the first supporting potion 25a.

In this arrangement, when both of the upper and the lower therapeutic members 26 is applied with the load from the user's body in the process of upward movement or the downward movement, the first and second supporting portions 25a, 25b pivot rearward against a force of the tension coil spring, and thus the abutment strip abuts against the contact 40a to turn the micro switch 40 ON. In contrast to it, when one of the therapeutic member 26 moves away from the body (when the upper therapeutic member 26 moves away from the shoulder), the first supporting portion 25a pivots forward by being urged by the tension coil spring 49 so that the micro switch 40 is turned OFF.

Therefore, the positions of the therapeutic member 26 at the moment when the micro switch 40 is switched from OFF to ON in the process of the downward movement of the therapeutic member 26, and at the moment when it is switched from ON to OFF in the process of the upward movement thereof are indicators of the position of the shoulder S, and the position detecting means 38 detects the positions as the first and second detected values $\alpha 1$, $\alpha 2$, $\beta 1$, and $\beta 2$.

Shown in Fig. 10 is an embodiment including a contact type sensor 40 provided between the therapeutic member 26 and its supporting shaft 30. A cylindrical slip collar 63 is fitted to the inner periphery of the therapeutic member 26, and the slip collar 63 is adapted to be fitted on a boss body 64. The boss body 64 is formed of a synthetic resin or the like, and comprises an internal cylindrical body 64a through which the supporting shaft 30 is inserted, a plurality of resilient plates 64b radially outwardly projecting from the outer peripheral portion of the internal cylindrical body 64a, and an external cylindrical body 64c connected to the outer end portion of the resilient plate 64b, wherein the outer peripheral surface of the external cylindrical body 64c is formed with two projecting ridges 64d extending about the axis of the supporting shaft, and the slip collar 63 is adapted to be fitted on the outer periphery of the projecting ridge 64d so as to rotate about the axis of the supporting shaft.

The resilient plate 64 is shaped like a blade of arcuate in cross section, and the internal cylindrical body 64a and the external cylindrical body 64c are adapted to be moved closer to and away from each other owing to the resilient deformation of the resilient plate 64b when a load is applied to the therapeutic member 26 in the direction orthogonal to the axis, and when no load is applied, the internal and external cylindrical bodies 64a and 64c are held concentrically owing

to the resilient restoration.

The sensor 40 has a inner electrode 40a to be fitted on the outer periphery of the internal cylindrical body 64a and the outer electrode 40b to be fitted in the inner peripheral portion of the external cylindrical body 64c, each electrode 40a, 40b is formed like a comb so that it can be inserted between the resilient plates 64b, and either one of the inner electrode 40a and the outer electrode 40b has a contact point 40c projecting toward the other electrode at the tip portion thereof.

The supporting shaft 30 is formed into a polygonal shaft such as a hexagonal shaft, and thus the inner surface of the internal cylindrical portion 64a is formed into a polygonal bore corresponding to the polygonal shape of the supporting shaft 30, thereby preventing rotation of the boss body 64 and the sensor 40 about the supporting shaft 30. The tip portion of the supporting shaft 30 is provided with a holding plate 65 fixed by means of the mounting nut 32 to prevent the therapeutic member 26, the boss body 64, or the like from falling off.

In this embodiment, when the upper therapeutic member 26 is applied with a load from the user's body in the process of upward movement or the downward movement thereof, the distance between the internal cylindrical body 64a and the external cylindrical body 64c is partially narrowed so that

the contact point 40c formed on the inner or the outer electrode 40a comes into contact with the electrode 40b to turn the sensor 40 ON. On the other hand, when the upper therapeutic member 26 moves away from the body, the resilient restoration of the resilient plate 64b turns the sensor 40 OFF.

Therefore, the position of the therapeutic member 26 at the moment when the sensor 40 is switched from OFF to ON in the process of the downward movement of the therapeutic member 26, and at the moment when it is switched from ON to OFF in the process of the upward movement thereof represents the position of the shoulder S, and the position detecting means 38 detects this point as the first and second detected values $\alpha 1$, $\alpha 2$, $\beta 1$, and $\beta 2$.

The embodiment shown from Fig. 11 to Fig. 13 includes a detector (pressure sensor) 40 for detecting the lateral load applied to the therapeutic member 26 provided between the supporting arm 25 and the therapeutic member 26 mounted on the upper side of the supporting arm 25.

In Fig. 12 and Fig. 13 showing the mounting structure of the therapeutic member 26, the supporting shaft 30 mounted to the supporting arm 25 is rotatably fitted in the boss body 31 of the therapeutic member 26, and the outer periphery of the therapeutic member 26 is formed in an arcuate inclined surface 26a curving inwardly toward the inner side in the lateral direction.

A detector 40 used here is a pressure (pressure-sensitive) sensor in which a pressure-sensitive conductive elastomer 40a including conductive particles is combined with an elastic material such as rubber as an insulating material is adhered between a pair of electrodes 40b, and this pressure sensor 40 is formed into a doughnut disc shape so as to be fitted on the supporting shaft 30 between the supporting arm 25 and the boss body 31 of the therapeutic member 26 so that the laterally outer side surface thereof is brought into contact with the laterally inner side surface of the supporting arm 25.

The laterally inner side surface of the pressure sensor 40 is covered with a doughnut disc shaped cover plate 36 and the laterally inner side surface of the cover plate 36 comes into contact with the boss body 31. The outer side surface of the cover plate 36 is provided with a plurality of detent projections 42 projected therefrom, which are each inserted into an insertion hole 43 formed in the supporting arm 25 so as to move along the axis of rotation of the supporting shaft 30.

In this arrangement, the cover plate 36 can push the pressure sensor 40 outward in the lateral direction with the rotation about the supporting shaft 30 restrained.

The cover plate 36 has a function as a pressing member for pressing the pressure sensor 40 as well as a function as

a protecting member for preventing the direct contact between the rotating therapeutic member 26 and the pressure sensor 40 to protect the pressure sensor 40 from, for example, being worn.

There is provided spacer members 35, 41 fitted on the supporting shaft 30 for keeping the distance between the boss body 31 and the washer 32a.

These spacer members 35, 41 comprises a first member 35 formed of a synthetic resin such as polyethylene or the like into a doughnut disc shape, and a second member 41 formed of a resilient material such as polyethylene rubber, sponge rubber or the like, so that the laterally inner side surface of the first member 35 is brought into contact with the boss body 31.

The second member 41 is axially compressed by tightening the mounting nut 32 with respect to the supporting shaft 30, and the resilient restoring force thereof presses the pressure sensor 40 via the first member 35, the boss body 31, and the cover plate 36, whereby the pressure sensor 40 is applied with a pre-load even when the therapeutic member 26 is not subjected to an external force in lateral direction.

The first member 35 and the cover plate 36 is preferably formed of a material of low frictional resistance or a structure to which a friction reduction process is applied on at least the surface that comes into contact with the boss body 31, whereby the rotation of the therapeutic member 26 about the supporting shaft 30 is performed smoothly.

In this arrangement, when the therapeutic member 26 is moved from the head side downwardly, and the therapeutic member 26 abuts against the upper surface of the shoulder S, the load F is applied to the therapeutic member 26 as a reaction force against the pressing force applied to the shoulder S.

Though the load F has mainly upward and downward components, since the therapeutic member 26 is supported in a overhanging state on the laterally outside thereof, a moment as shown by the arrow M is generated, and the moment M generates a force acting to incline the upper portion of the therapeutic member 26 laterally outwardly via the clearance between the supporting shaft 30 and the boss body 31.

The load F substantially includes a lateral component that presses the therapeutic member 26 laterally outwardly as shown in a phantom line due to factors such as a slight inclination provided to the inclined surface 26a on the outer periphery of the therapeutic member 26 or the supporting shaft 30, and the resilient deformation or the like of the therapeutic member 26 itself.

Since a force to incline or to laterally outwardly press the therapeutic member 26 is detected by the pressure sensor 40 via the cover plate 36 and the position of the massaging mechanism 7 (therapeutic member 26) at the moment of detection represents the position of the user's shoulder, the position detecting means 38 detects the position as the first detected

value $\alpha1$, $\alpha2$.

When the therapeutic member 26 is moved upwardly from the hip side, the load applied to the therapeutic member 26 from the back or the like is detected by the pressure sensor 40, and when the therapeutic member 26 moves upward away from the shoulder S, the load applied toward the therapeutic member 26 is not detected by the pressure sensor 40.

Therefore, the position of the therapeutic member 26 at the moment when the load is not detected represents the shoulder position, and the position detecting means 38 detects the position as the second detected values $\beta1$, $\beta2$.

As shown above, pre-load is applied to the pressure sensor 40 so that impairment of the accuracy of detection of the lateral load applied to the therapeutic member 26 due to the rattling in the lateral direction between the supporting arm 25 and the therapeutic member 26 or the like is prevented, whereby detection of the pressure and the detection of the shoulder position can be performed accurately.

Though the pressure sensor 40 is formed into a doughnut shape and arranged along whole periphery of the supporting shaft 30 in this embodiment, the pressure sensor 40 may be provided partially under or over the supporting shaft 30.

The embodiment shown in Fig. 14 comprises a groove 51 formed axially on the upper surface of the supporting shaft 30 supporting the upper therapeutic member 26 on the supporting

arm 25, and a distortion sensor as a detector 40 provided in the grove 51, in which distortion of the supporting shaft 30 generated by the load applied to the therapeutic member 26 is detected by the distortion sensor 40.

Therefore, since the load is detected by the distortion sensor 40 while the therapeutic member 26 abuts against the shoulder S or the back and is subjected to the load, and since the load is not detected when the therapeutic member 26 moves upward away from the shoulder S, the position of the therapeutic member 26 at the moment when the presence and absence of the load is switched represents the position of the shoulder S, and the position detecting means 38 detects the position as the detected values $\alpha 1$, $\alpha 2$, $\beta 1$, and $\beta 2$.

The distortion sensor 40 as described above may be provided on the side surface of the supporting arm 25 as shown in a phantom line.

In Fig. 15, the therapeutic member 26 is formed of a hollow resilient member, a passage 52 extending through the supporting shaft 30 is formed in the axial direction, and a connecting pipe 53 formed integrally with the therapeutic member 26 is hermetically connected to the tip portion of the passage 52, so that a hollow portion 54 in the therapeutic member 26 is in communication with the passage 52 via the connecting pipe 53.

A hose 55 is connected to the proximal end of the passage

52 on one end thereof and to the pressure sensor, or a detector 40 for detecting the air pressure in the hollow portion 54 on the other end thereof.

In this arrangement, since the air pressure in the hollow portion 54 increases when the therapeutic member 26 abuts against the shoulder S or the back and is subjected to the load, and the air pressure in the hollow portion 54 decreases when the therapeutic member 26 is moved away from the shoulder S, the vertical position of the therapeutic member 26 at the moment when the increase and decrease of the pressure is switched represents the shoulder position and the position detecting means 38 detects the position as the detected values $\alpha 1$, $\alpha 2$, $\beta 1$, $\beta 2$.

The position detecting means 38 shown in Fig. 11 to Fig. 15 may be constructed in such a manner that the therapeutic member 26 detects the load applied from the back or the hip or the like by means of the detector 40 to obtain the pressure distribution in the vertical direction, so that the position of the hip as well as the position of the shoulder S are detected by analyzing the obtained pressure distribution.

Fig. 16 shows a plurality of examples in the case where a non-contact sensor is used as the detector 40.

A detector shown by the reference numeral 40A is constructed of a pyroelectric infrared sensor for detecting infrared radiation emitted by heat from the user, or a

reflection type ultrasonic sensor for receiving the ultrasonic wave emitted to and reflected from the body, and mounted on the moving frame 6 at an off-centered position toward one of the left side or the right side thereof so as to pass along the rear side of the shoulder portion of the user in the vertical direction.

In this arrangement, by moving the massaging mechanism 7 upward or downward, the detector 40A detects heat or the reflected wave from the body when it is positioned on the back side of the body, and the detector 40A does not detect heat or the reflected wave when it is positioned above the shoulder.

Therefore, the vertical position of the massaging mechanism 7 at the moment when the presence or absence of heat or reflected wave is detected corresponds to the position of the shoulder S, and the position detecting means 38 detects the position as the detected values $\alpha 1$, $\alpha 2$, $\beta 1$, and $\beta 2$.

A detector shown by the reference numeral 40B is an optical sensor of light receiving type and mounted on the upper portion of the moving frame 6 at an off-centered position toward one of the left and the right sides so as to pass along the rear side of the shoulder portion of the user in the vertical direction.

The covering member 15 provided on the seatback portion 3 comprises a number of slits 58 formed in the vertical direction so that light from the outside enters into the

seatback portion 3.

With this configuration, while the massaging mechanism 7 moves upward or downward, light from the outside is blocked by the body when the detector 40B is positioned behind the body, and light entered into the seatback portion 3 via the slits 58 is detected by the detector 40B when the detector 40B is positioned above the shoulder.

Therefore, the position of the massaging mechanism 7 at the moment when the presence and the absence of detection of light from the outside is switched represents the position of the shoulder S, and the position detecting means 38 detects the position as the detected values $\alpha 1$, $\alpha 2$, $\beta 1$, and $\beta 2$.

A detector shown by the reference numeral 40C is a proximity sensor for detecting a marker 60 adhered at the specific portion of the body, and the proximity sensor 40C is mounted on the upper side surface of the supporting arm 25 so as to be placed as close to the user's body as possible.

As the proximity sensor 40C, a magnet sensor for detecting magnetism of the marker 60 constructed of a magnet or the like, a high-frequency coil antenna sensor for detecting the marker 60 formed of a dielectric coil sheet or the like are adopted.

With this arrangement, since the vertical position of the massaging mechanism 7 at the moment when the detector 40C detects the marker 60 represents the position of the specific

portion of the body, the position detecting means 38 detects the position as the detected values $\alpha 1$, $\alpha 2$, $\beta 1$, and $\beta 2$.

In this embodiment, by changing the position to adhere the marker 60, the specific portion may be changed freely, and thus the positions of the back, the hip and the like of the body as well as the shoulder S can be detected.

A detector shown by the reference numeral 40D is a transmission type photoelectric sensor comprising a light emitter D1 and a light receiver D2, which are mounted on the moving frame 6 to be opposed to each other so as to interpose the user's body therebetween.

With this configuration, when the photoelectric sensor 40D is positioned on the side of the user's neck, light travels through the indented portion of the back surface of the neck and thus it is turned ON, and when the photoelectric sensor 40D is positioned on the side below the shoulder, light is blocked by the body and thus it is turned OFF. Therefore, since the position of the massaging mechanism 7 at the moment when the photoelectric sensor 40D is switched between ON and OFF corresponds to the position of the shoulder S, the position detecting means 38 detects the position as the detected values $\alpha 1$, $\alpha 2$, $\beta 1$, and $\beta 2$.

The present invention is not limited to the embodiments described above, but rather modifiable as appropriate.

For example, in the flow-charts shown in Fig. 5 to Fig.

7, the process to detect the first and the second values and to compare and determine these values is performed twice, it is also possible to perform this process three times or more, and in this case, in the step of determination 3, whether or not three or more second detected values are in close agreement with each other is determined.

It is also possible to omit the processes of determination 1 and 2 by omitting detection of the first detected value but detecting only the second values for a plurality of times, and to determine the position of the specific portion in the determination 3.

The detector is not limited to the one shown in the embodiments described above, but rather modifiable as appropriate. The drive mechanism of the therapeutic member may be replaced with the one that drives the supporting arm and the therapeutic member by an air cell that is inflated and deflated by supplying and discharging air, for example.

The massaging apparatus is not limited to the chair type, but rather modifiable to other configurations.

[Effect of the Invention]

According to the present invention, as is described thus far, effective massage can be performed according to the physique of the user by recognizing a value detected accurately by the position detecting means as the position of the specific portion of the body for controlling massaging operation.

[Brief Description of the Drawings]

Fig. 1 is a view showing the principle of detection of a shoulder position according to an embodiment of the present invention.

Fig. 2 is a side view of the massaging mechanism.

Fig. 3 is a perspective view of the massaging mechanism.

Fig. 4 is a general perspective view of the massaging apparatus.

Fig. 5 is a flow chart showing the procedure of detection and determination of the shoulder position.

Fig. 6 is a flow chart showing the procedure of detection and determination of the shoulder position.

Fig. 7 is a flow chart showing the procedure of detection and determination of the shoulder position.

Fig. 8 is a front cross-sectional view showing another embodiment of the position detecting means.

Fig. 9 is a side view showing another embodiment of the position detecting means.

Fig. 10(a) is a front cross-sectional view showing another embodiment of the position detecting means (detector), and (b) is an exploded perspective view.

Fig. 11 is a side view showing another embodiment of the position detecting means (detector).

Fig. 12 is a front cross-sectional view showing the position detecting means (detector) shown in Fig. 11.

Fig. 13(a) is an exploded perspective view of the position detecting means shown in Fig. 11, and (b) is an exploded perspective view of the detector.

Fig. 14 is a front cross-sectional view showing another embodiment of the position detecting means (detector).

Fig. 15 is a front cross-sectional view showing another embodiment of the position detecting means (detector).

Fig. 16 is a front view showing another embodiment of the position detecting means (detector).

[Description of the Reference Numerals]

1	massaging apparatus
26	therapeutic member
38	position detecting means
40	detector
$\alpha 1$	detected value (first detected value)
$\alpha 2$	detected value (first detected value)
$\beta 1$	detected value (second detected value)
$\beta 2$	detected value (second detected value)

FIG. 1

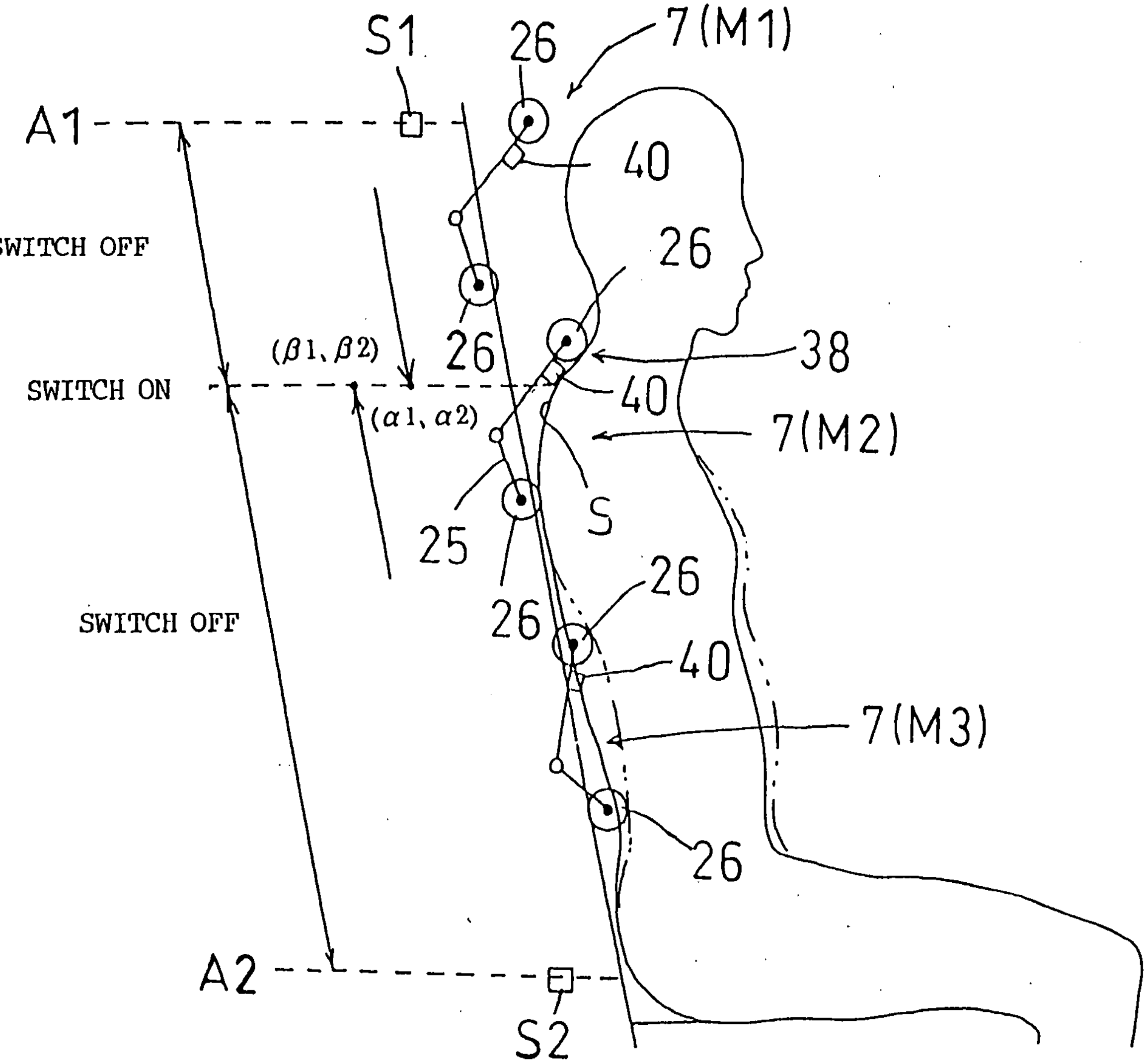

7(M1)
S1
26
A1
40
SWITCH OFF
26
26
38
(β1, β2)
SWITCH ON
40
(α1, α2)
7(M2)
25
S
26
26
SWITCH OFF
40
7(M3)
26
A2
S2

FIG. 2

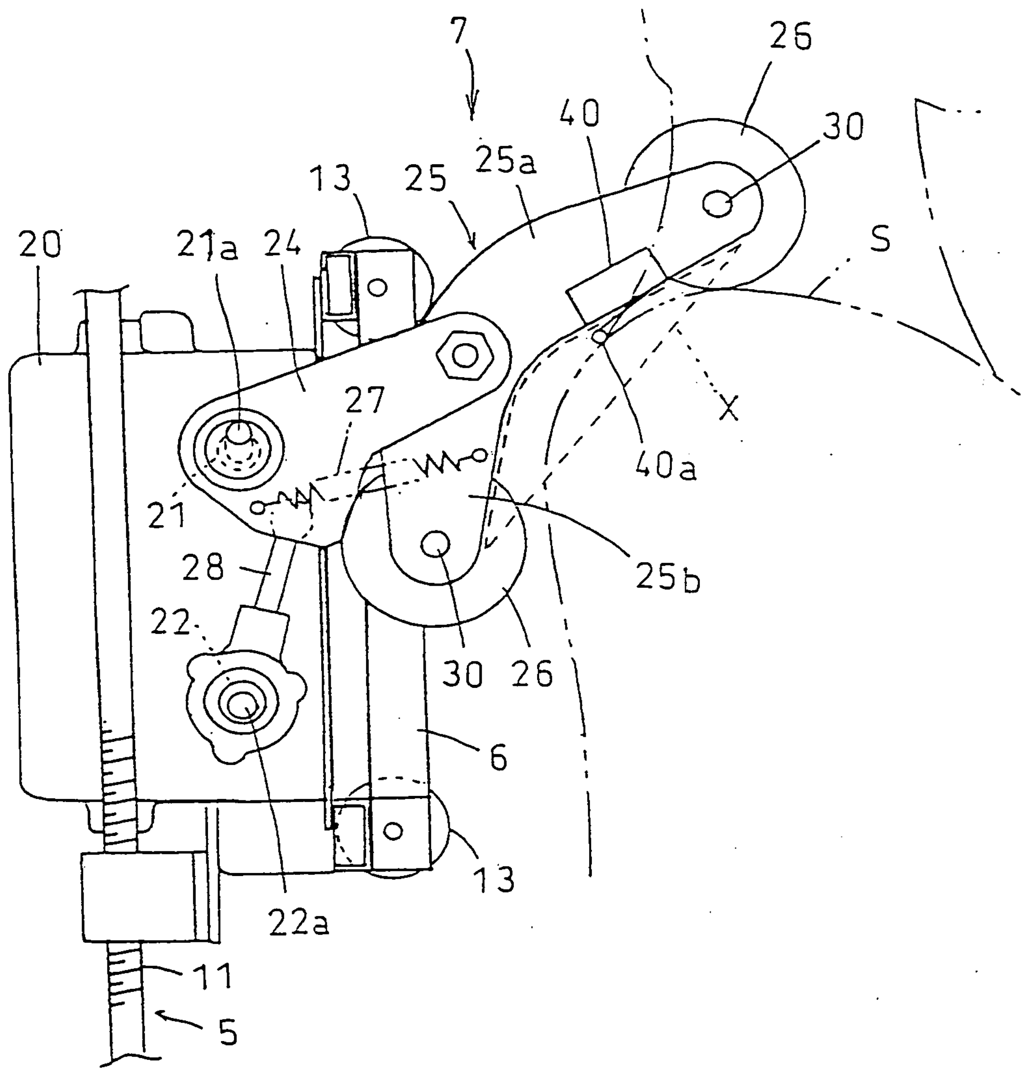

7
26
40
30
25a
13
25
S
20
21a
24
27
X
40a
21
25b
28
22
30
26
6
13
22a
11
5

FIG. 3

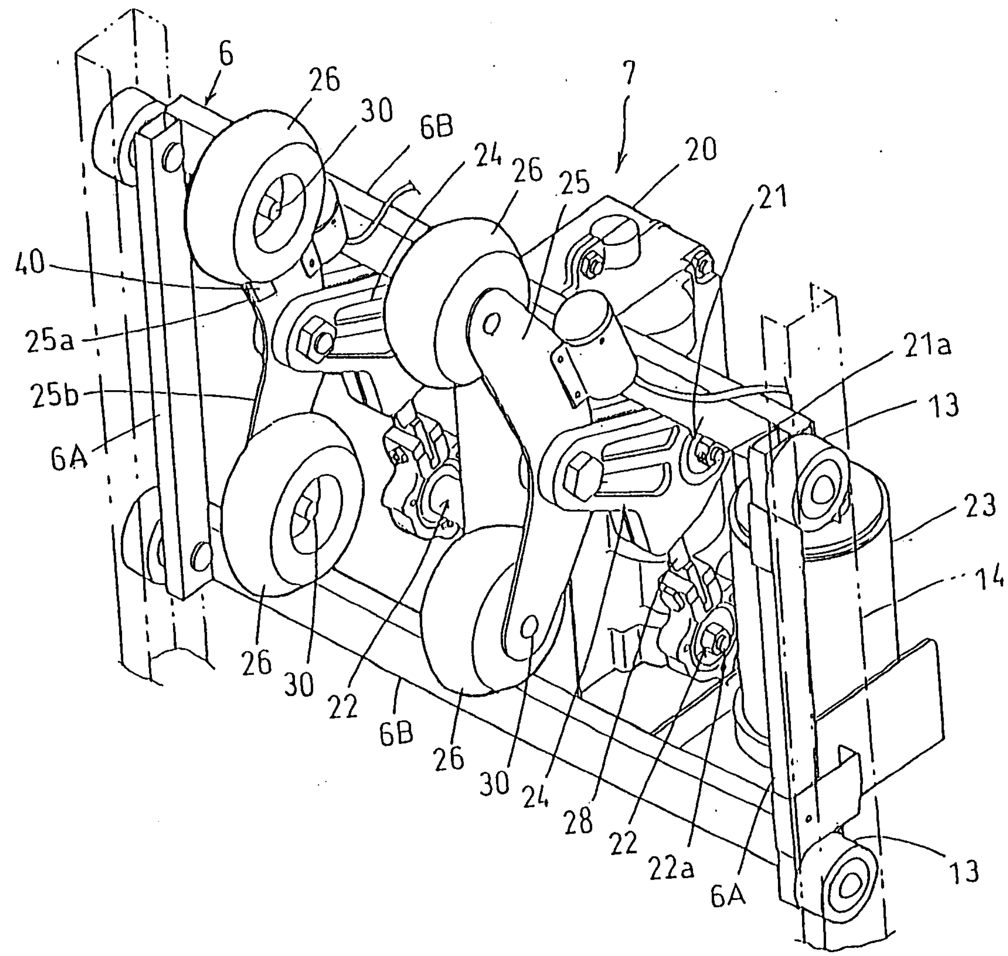

6
26
30
6B
24
26
25
7
20
21
40
25a
25b
6A
21a
13
23
14
26
30
22
6B
26
30
24
28
22
22a
6A
13

FIG. 4

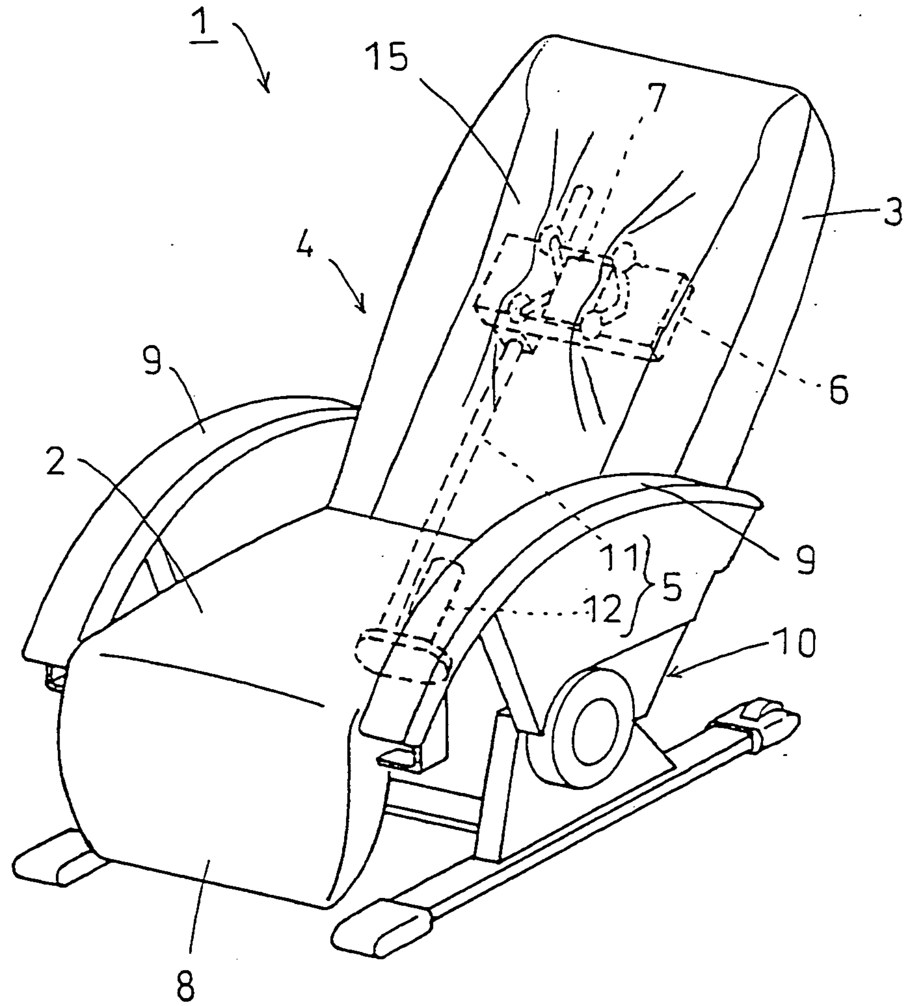


FIG. 5

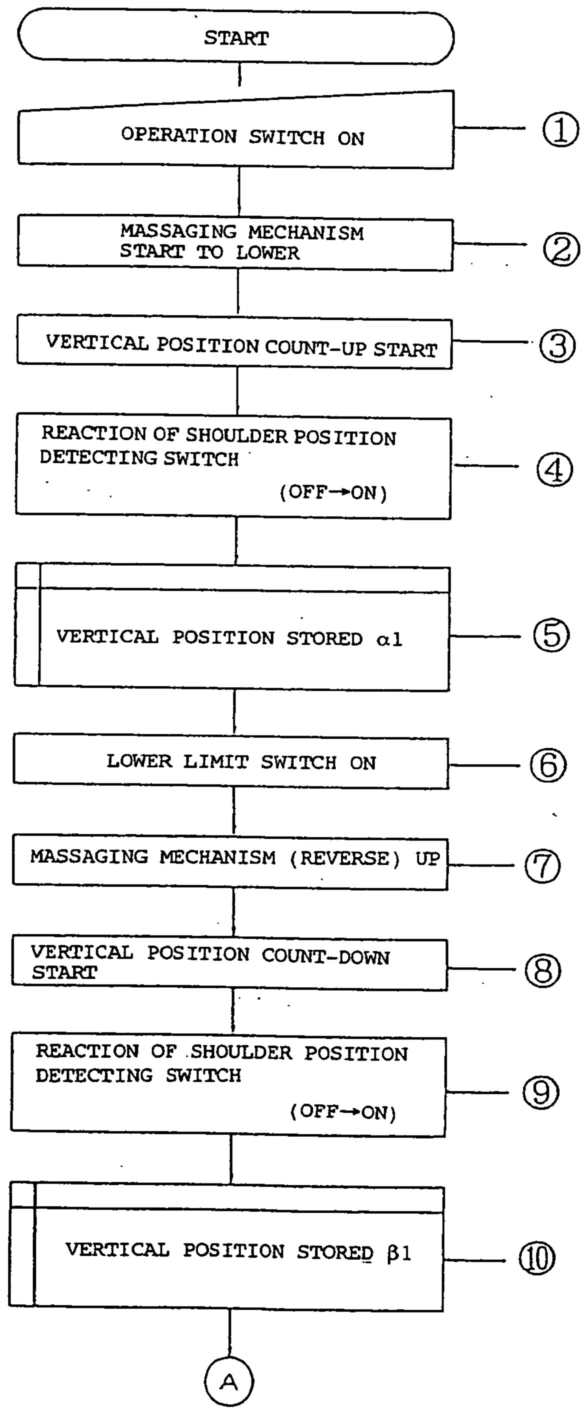

START
OPERATION SWITCH ON
①
MASSAGING MECHANISM START TO LOWER
②
VERTICAL POSITION COUNT-UP START
③
REACTION OF SHOULDER POSITION DETECTING SWITCH (OFF→ON)
④
VERTICAL POSITION STORED α1
⑤
LOWER LIMIT SWITCH ON
⑥
MASSAGING MECHANISM (REVERSE) UP
⑦
VERTICAL POSITION COUNT-DOWN START
⑧
REACTION OF SHOULDER POSITION DETECTING SWITCH (OFF→ON)
⑨
VERTICAL POSITION STORED β1
⑩
A

FIG. 6

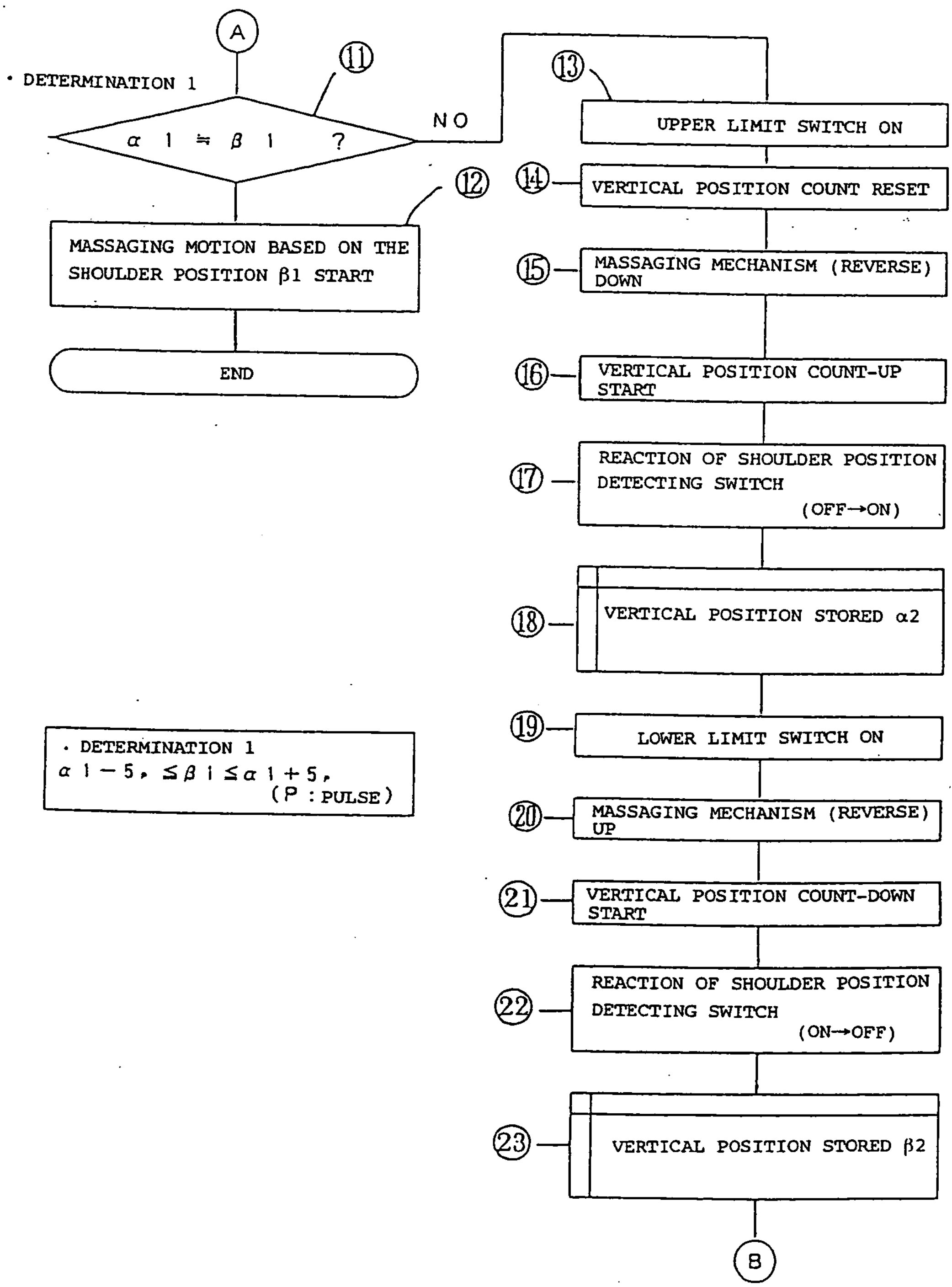

A
· DETERMINATION 1
⑪
$\alpha 1 \fallingdotseq \beta 1$?
NO
⑫
MASSAGING MOTION BASED ON THE SHOULDER POSITION β1 START
END
⑬
UPPER LIMIT SWITCH ON
⑭
VERTICAL POSITION COUNT RESET
⑮
MASSAGING MECHANISM (REVERSE) DOWN
⑯
VERTICAL POSITION COUNT-UP START
⑰
REACTION OF SHOULDER POSITION DETECTING SWITCH (OFF→ON)
⑱
VERTICAL POSITION STORED α2
⑲
LOWER LIMIT SWITCH ON
⑳
MASSAGING MECHANISM (REVERSE) UP
㉑
VERTICAL POSITION COUNT-DOWN START
㉒
REACTION OF SHOULDER POSITION DETECTING SWITCH (ON→OFF)
㉓
VERTICAL POSITION STORED β2
B
· DETERMINATION 1
$\alpha 1 - 5_P \leq \beta 1 \leq \alpha 1 + 5_P$
(P : PULSE)

FIG. 7

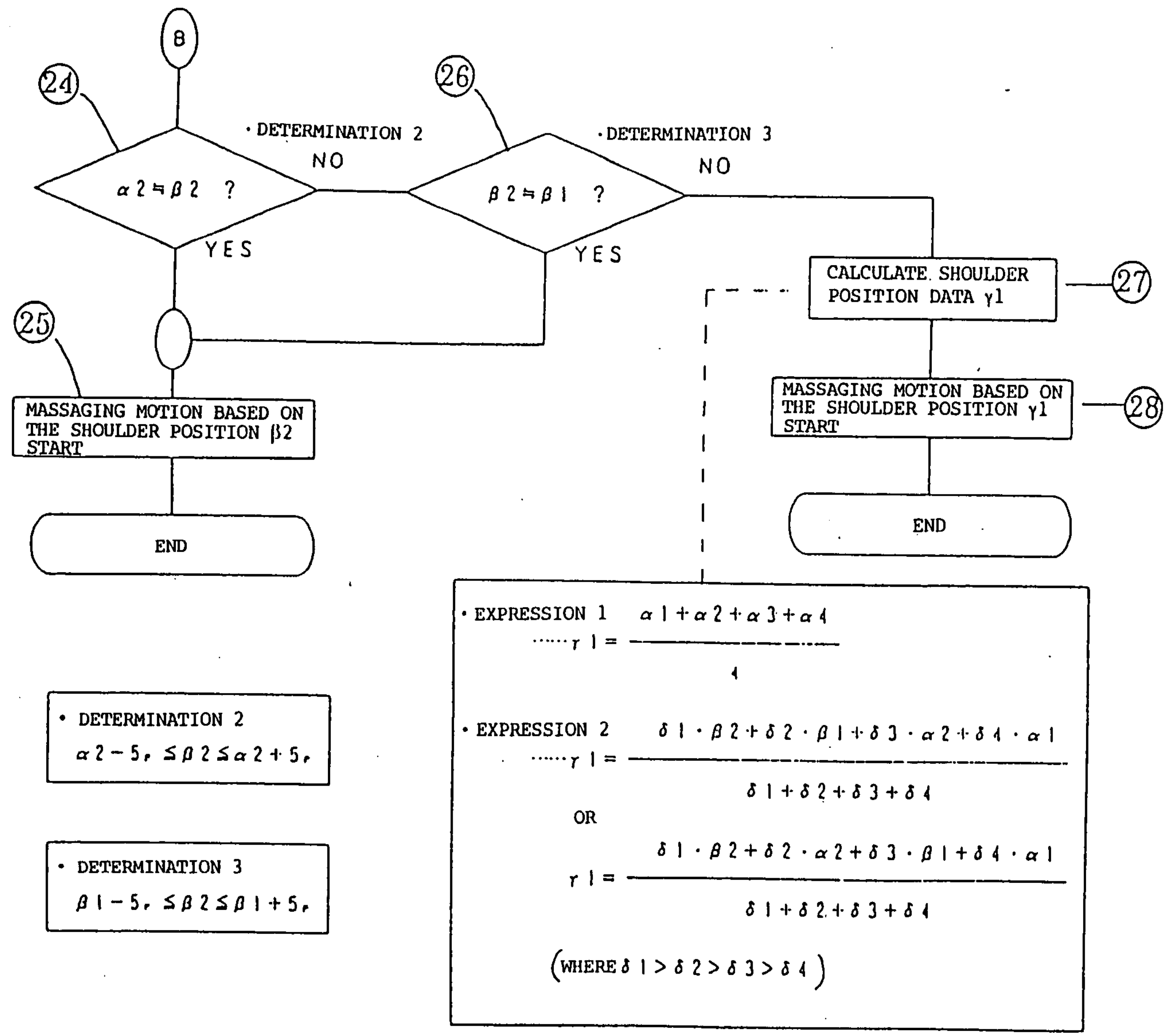

B
24
α2≒β2 ?
· DETERMINATION 2
NO
YES
26
β2≒β1 ?
· DETERMINATION 3
NO
YES
25
MASSAGING MOTION BASED ON THE SHOULDER POSITION β2 START
END
CALCULATE SHOULDER POSITION DATA γ1
27
MASSAGING MOTION BASED ON THE SHOULDER POSITION γ1 START
28
END
· DETERMINATION 2
α2−5, ≤β2≤α2+5,
· DETERMINATION 3
β1−5, ≤β2≤β1+5,
· EXPRESSION 1
······γ1 = (α1+α2+α3+α4) / 4
· EXPRESSION 2
······γ1 = (δ1·β2+δ2·β1+δ3·α2+δ4·α1) / (δ1+δ2+δ3+δ4)
OR
γ1 = (δ1·β2+δ2·α2+δ3·β1+δ4·α1) / (δ1+δ2+δ3+δ4)
(WHERE δ1>δ2>δ3>δ4)

FIG. 8

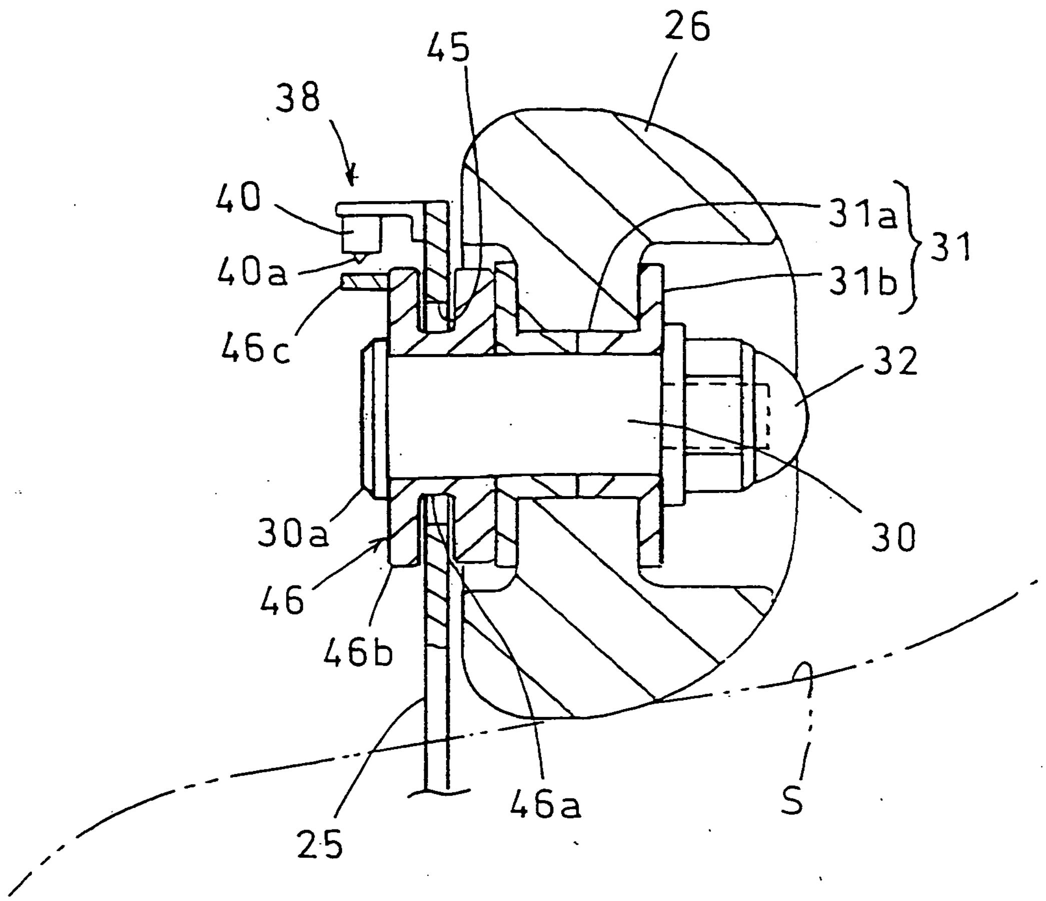


FIG. 9

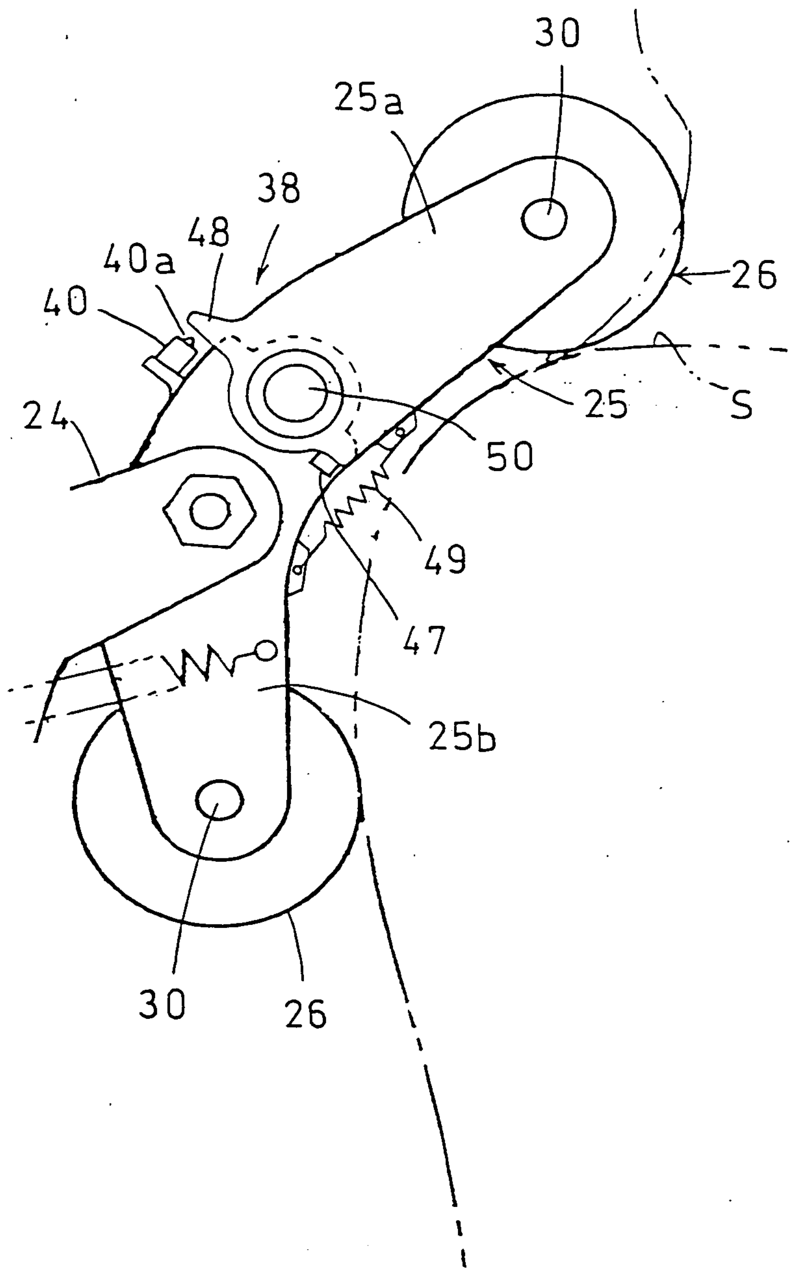
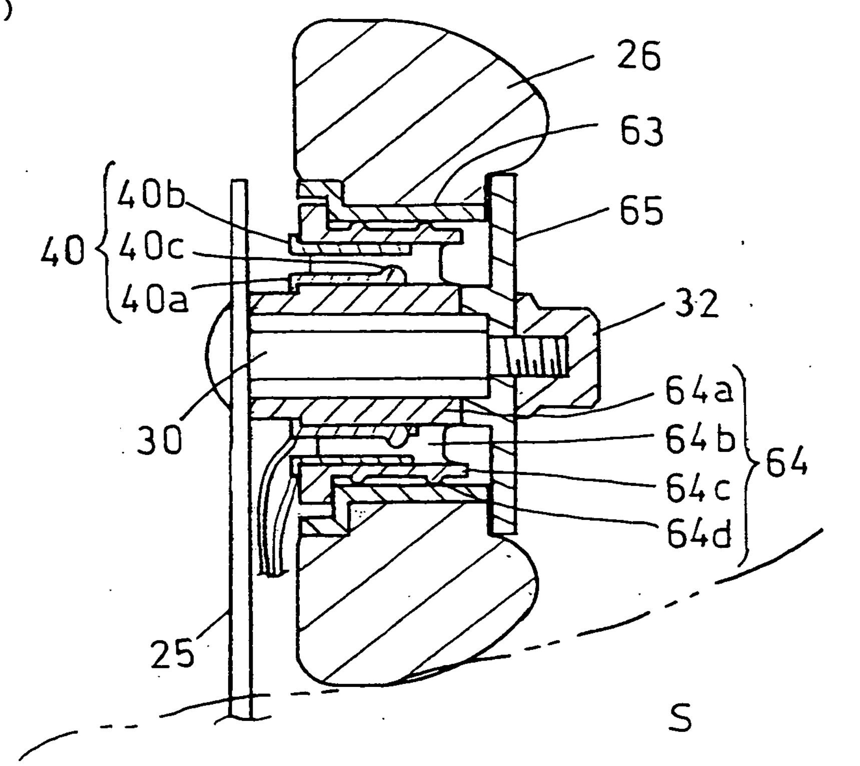


FIG. 10

(a)


26
63
65
40b
40c
40a
40
32
64a
64b
64c
64d
64
30
25
S

(b)

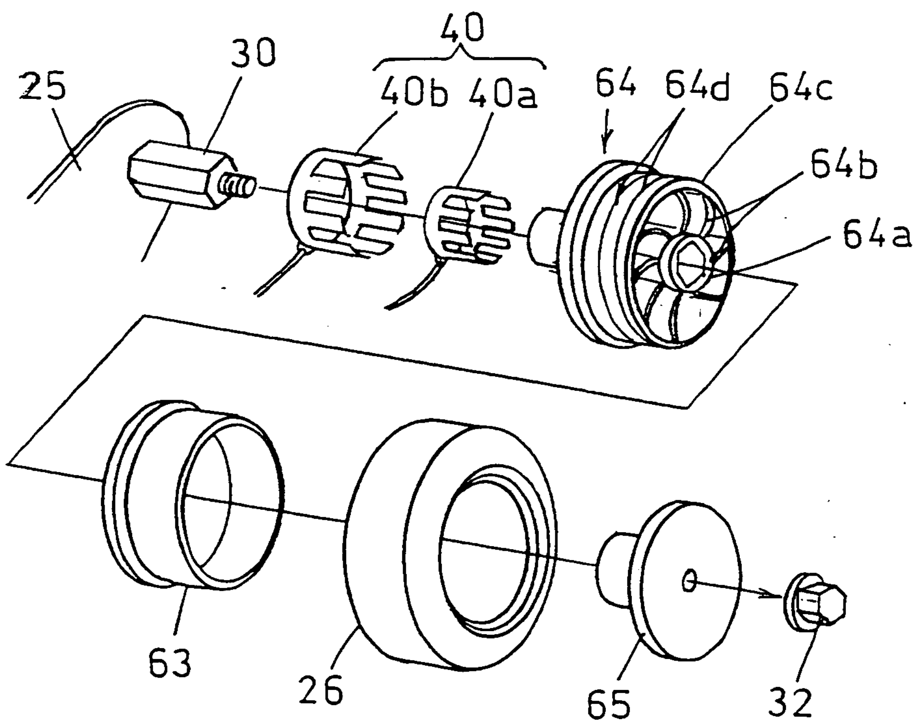

40
30
40b 40a
25
64 64d 64c
64b
64a
63
26
65
32

FIG. 11

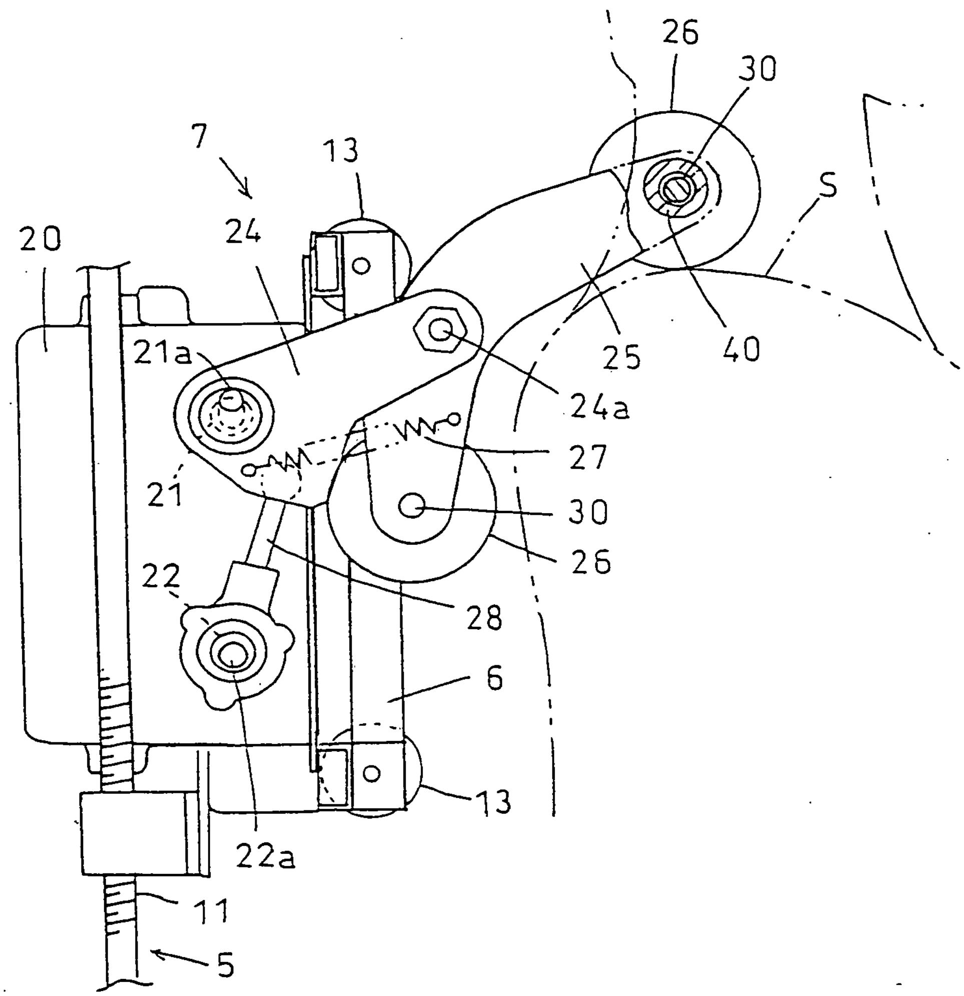


FIG. 12

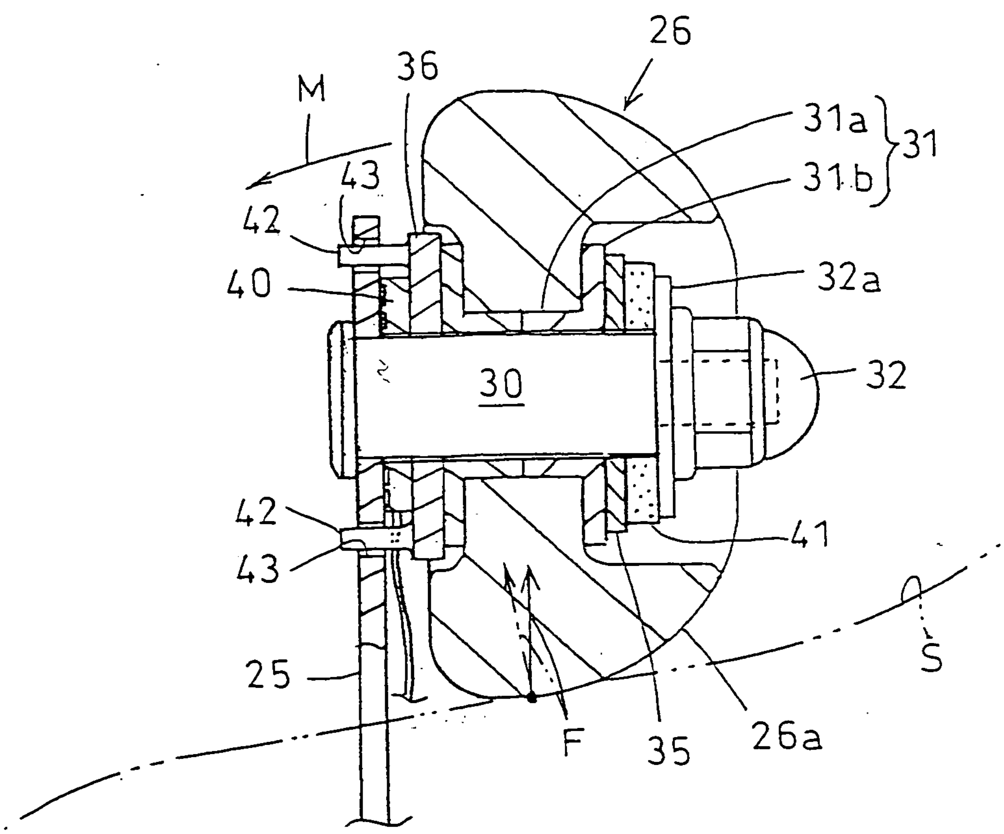
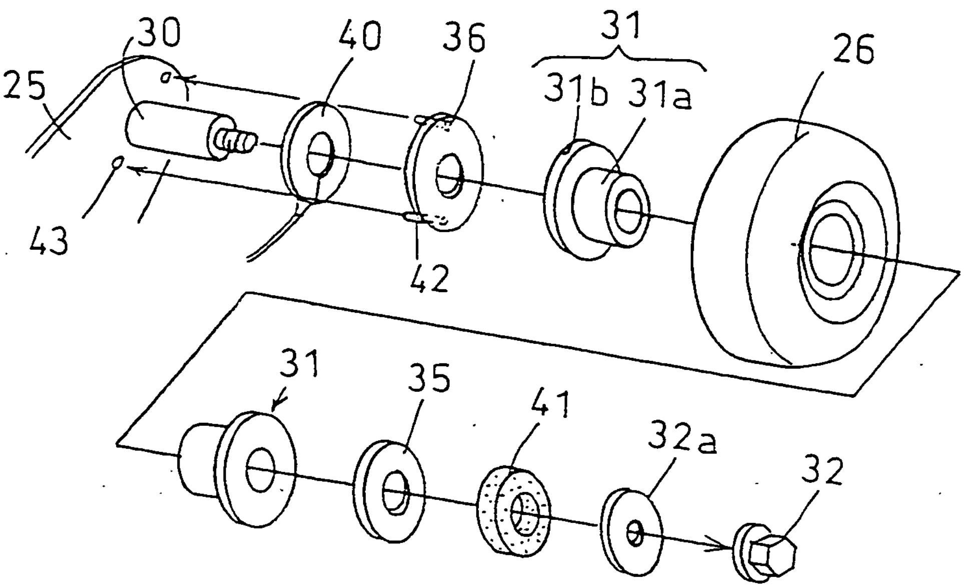


FIG. 13

(a)



(b)

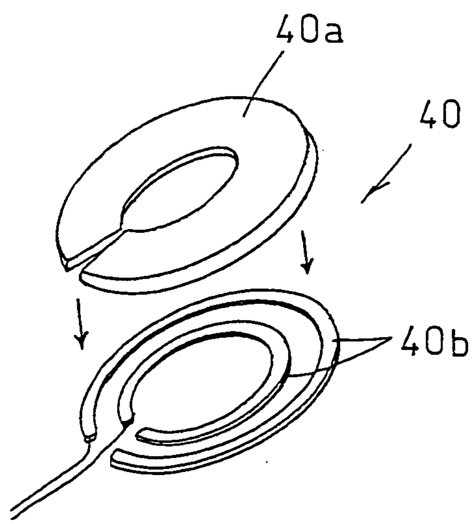


FIG. 14

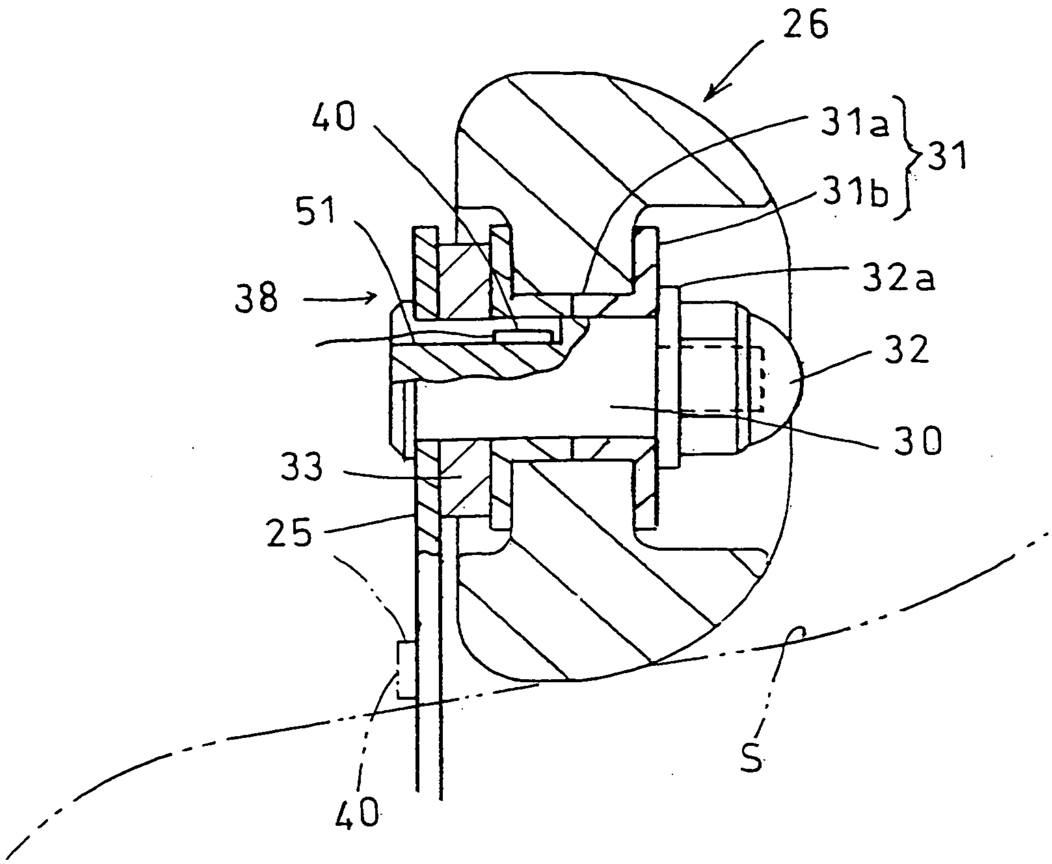


FIG. 15

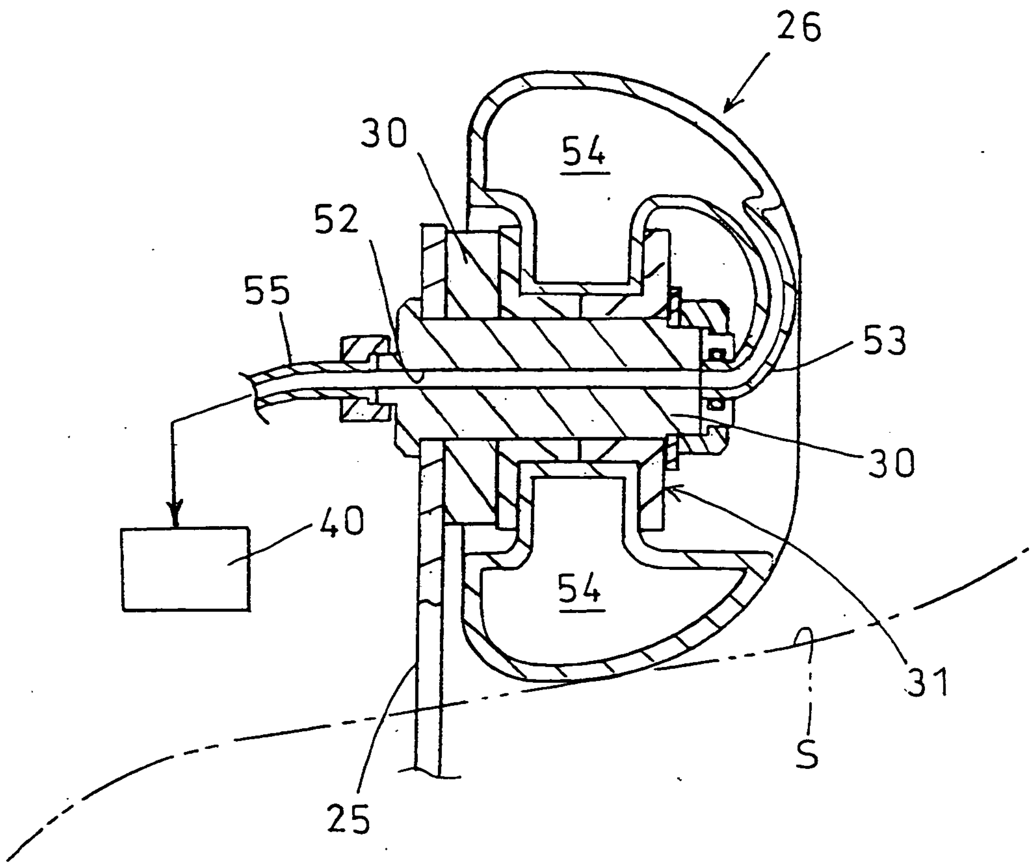
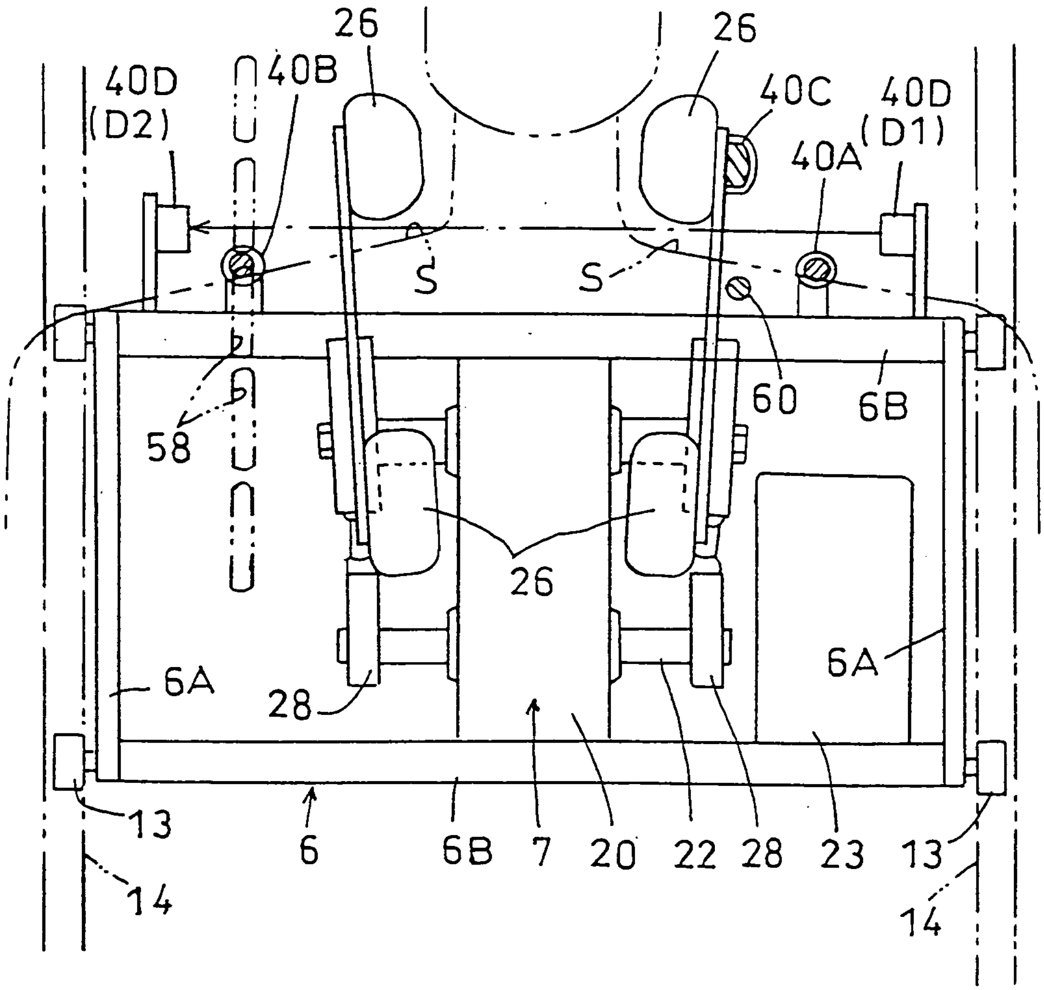


FIG. 16


26
26
40D
(D2)
40B
40C
40D
(D1)
40A
S
S
60
6B
58
26
6A
6A
28
13
6
6B
7
20
22
28
23
13
14
14

[Document Name] Abstract of the Disclosure

[Abstract]

[Object]

To provide a massaging apparatus which can recognize values β1, β2 accurately detected by a position detecting means 38 as shoulder positions that are recognized as reference points for controlling massaging operation.

[Means for solving the Problem]

A detected value β1, β2 obtained by a position detecting means 38 in a process of movement of a therapeutic member 26 from a position lower than shoulder S to an upper position is recognized as a shoulder position that is recognized as a reference point for controlling massaging operation.

[Selected Drawing] Fig. 1